



HIV RESOURCE REVIEW

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CALORIES AND ENERGY NEEDS

Research documenting the relationship between nutrition and the immune system has increased steadily over the past several years. As a result, many people living with the human immunodeficiency virus (HIV) now recognize the importance of reaching and maintaining optimal nutritional status.

Most people know that they need to consume an adequate amount of certain nutrients to support their body processes. Yet, inadequate caloric intake is evident in a majority of those living with HIV. (1-4) Subsequent weight loss plays a role in decreasing nutritional status and quality of life is adversely affected. Kotler relates that decreased functional performance often accompanies nutritional depletion. (5) Poor nutritional status affects quality of life, morbidity and mortality. HIV-positive individuals often experience a significant loss of body cell mass. (6-12) The depletion of lean body mass, reported even in the early stages of HIV, detrimentally affects quality of life and is often caused by poor oral intake. (13, 14, 5) Progressive loss of fat and non-adipose tissue cellular mass is evident in women as well as in men. (13, 5) Drolet and others relate that HIV-challenged patients with progressed disease have both inadequate energy and protein intake. (15) Some researchers have studied the effects of energy intake and disease progression indicators. A poster at the 1996 International Conference on AIDS noted total energy intake can be inversely related to T4 cell counts*. (16) Many scientists report that substandard caloric intake is the most influential factor of weight loss. (17-19, 5)

INTAKE AND WEIGHT LOSS

Von Roenn and others relate that weight loss in AIDS may be the result of interactions between diminished caloric intake, malabsorption, and alterations in energy expenditure. (8) As the T-cell count decreases the incidence of opportunistic infections rise. Weight loss increases the risk of hospitalization and the development of disease complications. (5) Isaksson reports hospitalized patients frequently reveal energy intakes that are lower than their calculated basal metabolic rate* (BMR). (20) Edens' research group points out nutrient-induced increases in metabolic rate are abnormally increased in acutely ill patients. (21) This information serves to alert us of the increased potential for weight loss in hospitalized people living with the HIV virus.

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ALTERNATIVE FOCUS: BITTER MELON

Bitter melon is the product of *Momordica charantia* (MC) a fast-growing vine, that's a staple of Asian cooking. (1) Sources note it's a medicinal plant that has been used for centuries in China, Southeast Asia and the Caribbean. (2-5) Many believe it has naturally occurring chemicals that can cure disease. (6,7) This alternative therapy purportedly has antiviral properties that help combat the symptoms of HIV and stop viral replication. The use of bitter melon has been of interest to the HIV community for years. (3, 7,8) One source notes that in 1992 the use of bitter melon as an alternative AIDS treatment was most likely limited to Los Angeles. (9) Bitter melon is known by a variety of names including MC (see table one on page 2). Many people think it's a useful therapeutic agent in the treatment of HIV infections. (1, 4, 5, 10-12) It's described as both a fruit and a vegetable. (2, 3, 7) The fruit of this plant looks similar to a cucumber. (10) It is a member of the Cucurbitaceae (gourd) family, the same family as the cucumber, squash, watermelon, and muskmelon. (1, 2, 4, 10) Some people note it's a relative of Chinese Cucumber, the source of GLQ 223 (otherwise known as

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EDITOR'S CORNER

The HIV ReSource Review is a bimonthly update on practical and timely HIV-related information. This newsletter provides nutrition resources for busy nutrition professionals. Newsletter articles provide a review of HIV-related research with a focus on areas pertaining to nutrition. Each feature article is the result of MEDLINE and AIDSLINE literature searches and multiple searches on the world wide web. Article information is supplemented by reviewing conference proceedings and the recommendations of experts.

Newsletter Purpose

* Help busy nutrition professionals acquire the resources needed to counsel HIV-challenged individuals effectively.

* Provide important, time-saving, HIV-related nutrition information from the most recent sources.

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NOV/DEC HIGHLIGHTS

NUTRITIONAL CARE GUIDELINES

CANCELLED

AZITHROMYCIN



ALTERNATIVE FOCUS: BITTER MELON

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Compound Q), another alternative therapy*.

An uncommon product in the American marketplace, it is commonly grown in warmer temperatures like Asia, India, Brazil, South America, Guam, and Haiti. It is also found in the states of California, Florida and Louisiana. (4,5,10)

The leaves and fruit of MC have a bitter flavor that is due to the alkaloid* morodicine. (10) Immature fruits are mildly bitter, have white flesh and are pointed at the blossom end. Ripe fruit is extremely bitter, yellow or orange in color, and tends to split open. Overripe fruits become even more bitter and spongy but bitterness can be lessened by parboiling or soaking in salt water. Some people note that ripe fruits are toxic to humans and animals. (10) Considering information found at web sites bitter melon contains several micronutrients. (5,10,12) It is said to contain high amounts of potassium, iron, beta carotene, and calcium. (5) Immature fruits are purported to be a good source of vitamin C with small amounts of vitamin A, phosphorus, and iron. (10) The vine tips of the MC plant supposedly contain vitamin A, protein, thiamin, and vitamin C.

SUGGESTED USES

Like most alternative therapies bitter melon is said to treat a large variety of conditions from fever to AIDS (see table 2 on page 3). (1-5,7,12) Sources report that Carmelite nuns in the Philippines treat cancer victims with bitter melon juice. (5) The MC vine and fruit are not subjected to pesticides because the fruit itself is a pesticide that insects dislike. (5) One web site distributor reports the value of bitter

melon. (13) Disclaimers note the distributor's statement is not appraised by the Food and Drug Administration (FDA).

Another web site offers not only bitter melon but a computerized nutritional consultation performed by a California Clinical Nutritionist. (14) The nutritionist analyzes a computerized nutritional questionnaire that is filled out through the Internet. The naturopathic practitioner is said to be proficient at recognizing a disorder that is related to the use of computers and various common maladies such as blood sugar problems. Each client receives a report that reveals connections between complaints and systems of the body. Recommendations include warnings of impending health problems with suggestions and supplement recommendations. Bitter melon is suggested for those people with a tendency toward diabetes.

STUDIES

One study published in 1978 notes the presence of a guanylate cyclase* inhibitor (GCI) in an aqueous extract of the bitter melon. (15) Claflin and others point out that the GCI/GMP* system may be involved in the formation of DNA and RNA, cell growth, and malignant transformation. Their study with rats notes an extract of bitter melon inhibited the formation of prostate cancer in vitro (test tube). The group was uncertain whether the anti-tumor agent and GCI were the same substance. Lin and others isolated toxic and non-toxic lectins from the bitter pear melon. (16) Lectins are plant glycoproteins* that stick to unique carbohydrate groups on the plasma membrane of cells. (17) They

are used in the laboratory to stimulate the rapid growth of lymphocytes and to clump together red

Table with 5 columns listing various names for bitter melon: Boston pear, Bitter apple, Cundeamor, Kho Qua, Cindeamor, Boston apple, Wild cucumber, Paria, Pare, Karela, Fu kwa, Kuguazi, Carillon Mexicane, Sorosi, Balsam pear, Bitter melon, Bitter gourd, Carilla plant, Ku Gua, Mexicane, Serrasee, Bitterleaf, Ampalaya, Cerrasee, Kerala, Margose, Nigai uri, Traeteur, Bitter cucumber, African cucumber, Chinese bitter melon, Concombre African, Concombre American, Melao de Sao Caetano, Momordica charantia

TABLE 1. VARIOUS NAMES FOR BITTER MELON

(Continued on page 3)



ALTERNATIVE FOCUS: BITTER MELON

(Continued from page 2)

blood cells. Other researchers have documented the properties of the MC plant. (18-21, 36) Barbieri and others completed test-tube studies and found that one lectin, and another protein purified from the seeds of MC, inhibits protein synthesis. (19) This group noted lectin and the inhibitor is to some extent toxic to mice. Falasca and others determined the amino acid and sugar compositions of the ribosome-inactivating protein (RIP) named Momordica charantia inhibitor (MCI). (20) Ribosomes are particles made of RNA and protein that are found in the cytoplasm of living cells and are necessary for viral replication. (17) Alpha-Momorcharin is part of a group of plant toxins perceived as RIPs that inactivate eukaryotic* ribosomes. (21)

Proponents' say malaria is one condition that improves with the use of MC. Researchers note that experiments of MC extracts have not shown any anti-malarial activity. (22, 23) Abortifacient effects of MC are documented in animals. These effects are said to be caused by alpha and beta-momorcharin (α/β M) which are found in the seeds of bitter melon. (24-27) The effect of MC on blood glucose levels is also documented. (28-34) Sarkar and colleagues recent study data suggests the mechanism of action (of MC) may be attributed to increased glucose utilization in the liver rather than an insulin secretion effect. (29) Another study verifies that diabetic patients who live in India routinely take MC believing it has useful hypoglycemic potential. (30) The study examined experimentally induced diabetic rats maintained on a semi-synthetic diet containing freeze dried bitter melon powder. The six week diet failed to provide any beneficial hypoglycemic effects.

Cunnick and others note the fruit and seeds of MC have anti-leukemic and antiviral activities associated with an activation of lymphocytes in rodents. (35) Their in vivo studies with lab mice revealed the bitter melon extract produced a toxic effect on cells. Further studies led

them to believe at least part of the anti-leukemic action of the extract was caused by the activation of natural killer (NK) cells in the host mouse. Ho and colleagues found sequence identity between alpha-momorcharin and other RIPs, such as trichosanthin, is high. (36) They note these similarities could explain the common biological activities that the compounds are said to share namely, abortifacient, immunosuppressive*, anti-tumor and anti-HIV.

Chinese researchers also note α/β M exhibits immunomodulatory (affects the immune system) activities. (25) Experimentation with leukemic mice suggests the combination of an anti-CD5 monoclonal antibody* and a RIP purified from MC might be useful for the treatment of graft-rejections, organ transplants and CD5-positive leukemias and lymphomas. (37) Porro's group accomplished in vitro experimentation with human T cell leukemia's. (38) They note short-term assays result in low cytotoxic activity of immunotoxins on tumor cells whereas longer cell exposure to the immunotoxin promotes adequate intracellular distribution.

HIV-RELATED RESEARCH

The majority of bitter melon references used at web sites are from authors in foreign countries, such as China and Japan. Many references are in obscure publications. Proponents of BM treatment note several organizations such as

federations and universities have done studies of MC. (12) Not many of these published accounts are easily accessible. Foa-Tomasi and others completed a study with an inhibitor from the seeds of MC and other RIPs. (39) Their study findings suggest RIPs, including MCI, impair viral replication by suppressing protein synthesis in virus-infected cells. Spreafico and others investigated the immunological activity of MCI and of Pokeweed antiviral protein in mice. (40) The group notes that injection of MCI may reduce NK cell activity while increasing macrophage-mediated spontaneous cytotoxicity. A crude extract from bitter melon inhibited tumor formation in lab mice that were given injections of tumor cells. (41) Jilka and others found that the in vivo anti-tumor effect required exposure of tumor cells to bitter melon extract in vitro followed by semiweekly injections of the extract into the mice.

"THE DIET CONTAINING FREEZE DRIED BITTER MELON POWDER DID NOT PROVIDE ANY BENEFICIAL HYPOGLYCEMIC INFLUENCE."

Information from several citations found in AIDSLINE is repeated in publications found through other sources. Takemoto has been involved in and lead several studies about MC. (35, 41-45) In 1982, Takemoto reported on the cytostatic* and cytotoxic activities of bitter melon. (42) The researcher noted cyclic GMP* might be involved in lymphocyte proliferation* and leukemogenesis. (43) Building upon Claflin's study this researcher reports a crude bitter melon extract preferentially holds back the soluble guanylate cyclase from leukemic lymphocytes. Takemoto's research group describes the purification and characterization of a cytostatic factor that exhibits anti-viral activity. (45) Leung and others in vitro and in vivo mouse studies also found cytostatic and cytotoxic activities in bitter melon extract. (27)

(Continued on page 11)

Alcoholism	Anemia	Aphrodisiac	Appetite stimulant
Arthritis	Cancer	Colds and Flu	Gastrointestinal
Colitis	Colic	Diabetes	Dysmenorrhea
Energy	Fever	Constipation	Gallstone disease
Hangover	Headache	Hepatitis	Hypertension
HIV/AIDS	Infections	Indigestion	Neuro-Muscular Disorders
Malaria	Psoriasis	Liver Disease	Viral Infections
Rashes	Ulcers	Stomachache	Poison Ivy/Poison sumac
Tumors	Scabies	Roundworm	Pre-menstrual syndrome

TABLE 2. SUGGESTED USES OF BITTER MELON



CALORIES AND ENERGY NEEDS

(Continued from page 1)

Grunfeld says fast weight loss with anorexia may be a forerunner of lesser infection in AIDS.⁽²²⁾

Health care providers often concentrate on the treatment of identifiable and reversible causes of bodyweight loss like opportunistic infection and adverse effects of drug therapy. Little thought is given to preventive nutritional services as a means to limit weight loss. Assuring HIV-positive people have the knowledge they need to limit weight loss, before it occurs, is beneficial to the individual as well as to the health care system. Adequate caloric intake can assist to limit secondary infections and decrease the incidence of malnutrition.⁽²³⁾ It can also improve response to drug therapy, increase functional capacity and decrease overall health care costs.⁽²⁴⁾

The consequences of infection are much more severe in those living with HIV. Infection can influence energy, protein and other nutrients.⁽²⁵⁾ Any infection decreases nutrient intake and increases nutrient losses. Scrimshaw notes the consequences of infection depend on the state of the individual before infection and the nature and length of infection and diet.⁽²⁵⁾ Inadequate dietary intake during infection and convalescence can severely affect nutritional status in the person living with HIV. Full recovery from various infections may not occur before other opportunistic infections place additional demands on the body. A weight loss of more than four kilograms (kg) in less than four months, accompanied by anorexia, is a sign of secondary infection.⁽²⁶⁾ Grunfeld and Feingold report maintaining a record of the weight of each AIDS patient will provide an early warning of infections.⁽²⁷⁾

An individual's ability to track weight status and meet nutrient needs deserves early and thorough investigation during HIV disease. We know malnutrition affects quality of life, immune function, and survival.^(28-34, 5) With this in mind it

seems prudent to incorporate cost-effective measures that can delay or omit the incidence of unnecessary weight loss. The nutrition assessment is crucial in setting realistic goals to reach optimal nutritional status. It is one of the most helpful services that we can offer at any stage of HIV disease. A complete nutritional assessment that includes an accurate calculation of energy needs and a thorough assessment of factors that may detrimentally affect nutritional intake is invaluable.

ENERGY INTAKE FACTORS

There are several factors that play a role in energy intake. Inadequate nutrition knowledge, or a lack of nutrition awareness, can have a negative effect on energy intake. A lack of knowledge coupled with inadequate nutrient intake can result in a harmful decrease of body cell mass that often places an individual at increased risk of HIV-related complications. It can seriously impair one's ability to reach and maintain a healthy weight. In the HIV-challenged nutrition awareness is critical to avoid unnecessary weight loss. It's a tool that can be very helpful in increasing both diet quality and quantity. Some people know that an optimal meal plan can help them to avoid weight loss. Yet, few people living with HIV are aware of their individual nutrient needs. This lack of knowledge greatly impairs their ability to meet increased energy demands. The provision of adequate and appropriate nutrition information can help individuals to expand nutrition knowledge and to meet caloric requirements.

Another factor to be aware of that plays a role in energy intake is the synergistic relationship between nutrients. Some nutrients depend on the adequate intake of calories. For instance, calorie and nitrogen intake influence the content of body protein.⁽²¹⁾ Edens points out that the human brain requires about 500 calories (kcal) of carbohydrate each day.⁽²¹⁾ To

meet energy requirements of brain cells the human body must supply energy as glucose.⁽³⁵⁾ The brain consumes approximately two-thirds of the total glucose used each day. During fasting body protein is sacrificed to insure that this energy requirement is met. Therefore the importance of adequate body protein mass, that is critical for good health and recovery from illness, should always be stressed in people living with HIV.⁽³⁶⁾ Even a basic

"IN THE HIV-CHALLENGED NUTRITION AWARENESS IS CRITICAL TO AVOID UNNECESSARY WEIGHT

understanding of nutrients can assist in improving dietary adequacy. Increased nutrient knowledge should serve to reinforce the need to consume an adequate amount of kcal.

Even though individuals may be aware of their nutrient needs, and possess the resources to meet those needs, they may be prevented from doing so. Additional factors that affect nutrient intake often negate the consumption of a diet that is adequate in nutrients (see table 1 on page 6).^(1, 3, 37-41) Fatigue, one of the most overwhelming side effects of HIV treatment, often results in decreased nutrient intake.⁽⁴²⁾ Simple pleasures that healthy individuals take for granted may not be experienced by those with HIV. Generally, perceptions of taste and smell stimulate and optimize nutrient intake and absorption. In HIV disease, side effects of drug therapy often alter taste perceptions.^(43, 44) The smell of food can exacerbate nausea, a frequent side effect of common medications, and can result in decreased nutrient intake as well. Knapp notes people do not appreciate the nonspecific adverse effects of many medications on food ingestion.⁽⁴⁴⁾ The use of fad diets and self-prescribed dietary supplements often result in nutrient inadequacy or excess and nutrient-nutrient competition.^(45, 46) Poor economic conditions and ethnic or cultural practices can also detrimentally affect

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MED WATCH: Megestrol acetate

Megestrol acetate (Megase®) is an artificially made substitute for progesterone. It is manufactured to help people who have a medical need to gain or maintain body weight. Megase® increases appetite and food intake. It is commonly prescribed for patients with anorexia, breast cancer and for cachexia associated with HIV infection. Megase® is suggested for certain AIDS patients with illness-related persistent weight loss more than or equal to 5% of ideal body weight. Improvement in appetite is often noted after a few days of treatment. Increases in weight gain have been reported as mainly fat mass. Some patients on this treatment have reported an increased sense of well-being, higher quality of life, and elevated mood.

DOSAGE: Available in a tablet form and lemon-lime flavored oral suspension. The amount prescribed for adults is often 800 milligrams (20 mL) per day. A maintenance of 10 mL may be suggested. Patients should consume Megase® at the same time each day, ideally at breakfast. Appetite and food intake should be assessed every four months.

ABSORPTION: Like many drugs Megestrol is rapidly absorbed with a bioavailability of greater than 90%.

NOTABLE SIDE EFFECTS: Megestrol acetate has been associated with alopecia, anemia, asthenia, chest pain, depression, diarrhea, dyspepsia, dyspnea, edema, elevated hepatic enzymes, flatulence, high blood pressure, hypercalcemia, hyperglycemia, insulin resistance, pain, nausea and vomiting.

DRUG INTERACTIONS: Interactions with bromocriptine and warfarin have been noted. It may be necessary to lower doses of warfarin when megestrol acetate is given.

CONTRAINDICATIONS: Pregnancy, breast feeding, hepatic disease and diabetes mellitus.

SOURCES:

- ◇ Megase® Prescribing Information. Bristol-Myers Squibb Company. Princeton, NJ. 800/426-7644
- ◇ Summerbell CD, Youle M, McDonald V, Catalan J, Gazzard BG. Megestrol acetate vs cyproheptadine in the treatment of weight loss associated with HIV infection. *Int J STD AIDS*. 1992;3(4):278-80.

RESOURCE CORNER

WORLD WIDE WEB SITES

INTERNATIONAL ASSOCIATION OF PHYSICIAN'S IN AIDS CARE

The International Association of Physician's in AIDS Care (IAPAC) has a web site that provides information specifically related to HIV and AIDS. This site maintains links to many other Internet resources some of which are international. Their nutrition information is limited but useful. To check out the IAPAC site go to: <http://www.iapac.org/net/resources.html>.

AIDS EDUCATION GLOBAL INFORMATION SYSTEM (AEGIS)

The largest HIV and AIDS database in the world can be found at AEGIS. Aegis contains an almost endless array of resources from basic information and reference material to clinical trial information. This sites' Clinical Trials Finder helps to find trials that are at various locations. In addition to the vast amount of information found here is an awesome list of links to other informational sites. Stop by this site that can be found at: <http://www.aegis.com>.

PRINTED MATERIAL

Nutrition and HIV: A New Model for Treatment is written by Mary Romeyn who is both a dietitian and a San Francisco internist. Mary specializes in the care of HIV-challenged

individuals. Romeyn's book contains HIV-related nutrition information and micronutrient recommendations. The 366 page book is available through:

Jossey-Bass Publishers
P.O. Box 44305
San Francisco, CA 94144
415/433-1767

Two patient education resources are available from Nestle Clinical Nutrition InfoLink™ (formerly Clintec). *Nutrition Guidebook for People Living With HIV/AIDS* contains nutritional guidelines and addresses nutritional needs for various problems related to HIV. *The Inside Story: A Trip Through the G.I. Tract* is accompanied by a video with the same name. These two resources help guide patients through the G.I. tract so they can understand body processes.

The booklets and the video are available from:

Nestle Nutrition Company
800/422-2752

Individuals seeking recipes to share with HIV-positive individuals will find *Positive Cooking: Cooking for People Living With HIV* a useful resource. The cook book contains basic nutrition advice, food recommendations and easy to prepare recipes. This 251 page cook book is available for \$12.95 a copy through:

Avery Publishing Group
120 Old Broadway
Garden City Park, NY 11040
800/548-5757



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nutritional status. (47) Accurate identification and evaluation of medical, dietary and socioeconomic data are essential for the development of efficacious care plans.

We know the key to reaching and maintaining a favorable nutritional status is the consumption of a diet that is adequate to meet total protein and energy needs. Yet, it is difficult to meet nutrient requirements if one has difficulty in getting food or is unaware of nutrient needs. (47) Data analysis from a recent four month food bank study of 126 clients reveals HIV-challenged individuals can experience reduced nutrient intake due to inadequate nutrient knowledge. (48) Meyer notes that a majority of the clients in her study had difficulty in getting food and were not aware of their energy needs. They were more likely to experience weight loss. Recall of dietary habits revealed that these individuals often ate unbalanced, irregular meals that were unlikely to meet caloric needs. Nutrition education and counseling would enable individuals like this to optimize macronutrient and micronutrient intake.

Although increased caloric intake is evident in some HIV-infected men decreased nutrient consumption is much more prevalent in people with HIV. (49) Suboptimal oral intake is prominent in male and female drug addicts and in AIDS patients. (11, 50) The 56 HIV-challenged, inner-city adults in Luder's study had a mean energy intake that was 74% of the Recommended Dietary Allowance (RDA). (51) Dworkin and others completed a detailed analysis of a three day diet record in HIV-positive patients and found deficiencies in kcals and micronutrients. (52) Total caloric intake appeared to be lower in the patients with AIDS Related Complex as compared to AIDS patients or HIV-positive patients without significant manifestations of the disease. More than 87% were ingesting less than 50% of the RDA for at least one nutrient. (52)

Allergy	Altered smell and taste	Alternative therapies	Food avoidance	Socioeconomic activity
Fatigue	Dietary habits	Early satiety	Food intolerance	Supplementation practices
Appetite	Gastrointestinal problems	Polypharmacy	Foodborne illness	Medication side effects
Nausea	Inadequate meal planning	Oral manifestations	Poor dentition	Nutrition awareness
Coughing	Cultural practices	Ethnic practices	Dysphagia	Opportunistic infections

TABLE 1. POSSIBLE VARIABLES AFFECTING NUTRIENT INTAKE

A diet that is adequate in macronutrients and micronutrients helps the individual living with HIV to avoid many of the consequences of dietary inadequacy. Most clinicians find it useful to investigate an individual's knowledge of nutritional needs when preparing the care plan. Adequate nutrient intake makes it possible to meet increased needs that can be the result of hypermetabolism, fever, and opportunistic infection. To best relay what actual nutrient needs are it's helpful to know what the person perceives to be his or her 'real' needs. The HIV-challenged individual can meet established kcal and protein requirements with less effort if they are aware of the difference between perceived and 'real' needs.

We know it's common for individuals to lose several pounds in a short period of time during bouts of illness and poor food intake. Adding to this increase in nutritional risk are the HIV-challenged individuals who limit caloric intake because they believe that a weight less than desirable body weight (DBW) is adequate. (53) Some homosexual men have become accustomed to weighing less than the DBW for their stature and frame size. Significant weight loss, especially in individuals who weigh less than 90% of DBW, often results in a weight that is insufficient to support life. (28) Individuals who are accustomed to weighing below their DBW experience an unnecessary decrease in nutritional status when UBW declines. (48) Some may even initiate weight loss efforts when told that they weigh a small percentage above DBW. It is imperative that people understand the importance of consuming an adequate amount of kcals to assist them in maintaining a healthy weight.

TOTAL ENERGY EXPENDITURE

Determination of an adequate daily caloric level necessitates review and understanding of the various factors that affect the real determinant of energy balance, total energy expenditure (TEE). Caloric requirements are based on several components of TEE (see table two on page 7). These components include resting metabolic rate (RMR), thermal effect of exercise, thermal effect of food (obligatory expenditure associated with nutrient assimilation), and facultative thermogenesis. (54, 17, 55, 56)

Carbohydrate is the major nutrient regulating production of the metabolically active thyroid hormone that affects RMR. (54) RMR usually accounts for 50-75% of TEE. (54, 57) This measurement includes energy expended for normal body functions and homeostasis*. It also includes a component for activation of the sympathetic nervous system. BMR, the total energy output of a person at rest after a 12-18 hour fast, declines from a maximum in infancy. (54, 58) The BMR is measured in the morning before any physical activity or food consumption and may be a bit lower than RMR. The difference is very slight and RMR is the most used measurement. BMR and RMR are often used interchangeably by some individuals. The amount of energy required to meet the RMR is known as the resting energy requirement (REE). Factors known to influence REE are nutritional status, thyroid function, and activity in the sympathetic nervous system. As with BMR and RMR the terms basal energy expenditure (BEE) and REE are used

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interchangeably because they vary by less than 5%. A recent study reports REE is influenced by tumor necrosis factor.⁽⁵⁹⁾ Genetics contributes 11% to the difference in REE per kg of fat free mass (FFM).⁽⁵⁴⁾ Ravussin and others note that differences in age, gender and FFM can account for 83% of the difference in REE between individuals.⁽⁶⁰⁾ Differences in body size, gender or age are, for the most part, corrected if data are related to FFM.⁽⁵⁴⁾

Thermal effect of exercise is the second largest component of energy expenditure and includes physical activity above basal levels.⁽⁵⁴⁾ HIV-negative people use anywhere from 90 kcals per hour, if they are sedentary, to more than 1,000 kcals per hour if extremely active.⁽⁶¹⁾ Alterations in energy expenditure, up to 15 times above the BMR, may be achieved with intense activity and exercise may raise BMR for at least 18 hours. The thermal effect of exercise in a moderately active person comprises 15-30% of total energy requirements.⁽⁵⁴⁾ Ravussin's group found that fidgeting accounted for 100-800 kcals per day.⁽⁶⁰⁾ Popular pastimes like bicycling and swimming typically require an additional 300-800 kcals per hour.⁽⁶¹⁾ A small study found that athletes had a 13% higher BMR than controls if related to FFM and 16% if related to both FFM and fat mass.⁽⁶²⁾ Immediately after intense exercise food intake is decreased but, for moderately active HIV-negative individuals, habitual exercise seems to increase caloric intake.⁽⁶³⁾ Bouchard and colleagues learned that approximately 40% of the variance in the energy cost of low-to-moderate intensity exercise, RMR, and thermal effect of food are explained by inherited characteristics.⁽⁶⁴⁾

Diet-induced thermogenesis (thermal effect of food) refers to the increase in energy expenditure above BMR that happens for several hours after eating.⁽⁵⁴⁾ The thermal effect of food results from energy expended to digest, transport, metabolize, and store food. This effect accounts for 3-24% of the

energy content of a meal and depends on the metabolic fate of ingested substrate. Protein produces the greatest thermal effect of food. Kinabo and Durmin completed a small study that suggests the thermal effect of food is significantly influenced by the energy content of a meal.⁽⁶⁵⁾ Scientists used indirect calorimetry* to evaluate the thermogenic response to a test meal in 16 HIV-positive patients and a control group.⁽⁶⁶⁾ REE was compared to the estimated BEE based on a frequently used tool to calculate energy needs (Harris-Benedict Equation). The scientists found that after-meal energy expenditure was more increased in the HIV-positive patients. The increase in post-prandial energy expense was even more elevated in those who had noted a clinical change in their nutritional status. Poizot-Martin and colleagues relate that the increased REE and thermal effect of food in people living with HIV contributes to weight loss. The thermal effect of food varies greatly among individuals and repeated measurements so we need to interpret studies cautiously.⁽⁵⁴⁾

Facultative thermogenesis appears to account for up to 15% of TEE.⁽⁵⁴⁾ It's the difference in energy induced by changes in surrounding temperature, food intake, emotional stress, and other factors.⁽⁶⁹⁾ Prolonged periods of decreased energy intakes result in a dwindling BMR that is greater than may be accounted for by decreases in FFM. Henriksson points out in HIV-negative individuals muscle glucose oxidation is decreased by starvation and further muscle adaptations might include a decrease in BMR.⁽⁶⁷⁾ Soares and others note in the chronically undernourished BMR changes are reversible.⁽⁶⁸⁾ Much of the variance in energy requirements may be accounted for by FFM, age, gender, and the level of individual physical activity.⁽⁵⁴⁾

PREDICTING NEEDS

Human energy requirements are predicted with the use of a variety of tools. Prediction equations like Harris-Benedict (HBE) are the result of indirect calorimetry measurements. Many of the equations that were used to predict REE in the past remain in use today.^(69,70-77) Schofield proposed equations for use by the 1985 Food and Agriculture Organization (FAO), World Health Organization (WHO), and United Nations University (UNU) Nutrition Committee.⁽⁶⁹⁾ Many individuals calculate the BEE by using the time-tested Harris Benedict multi-parameter regression equation.⁽⁷⁸⁾ BEE can also be calculated using a variety of equations similar to the HBE, measuring energy consumption by indirect calorimetry*, or with the use of a metabolic cart. In 1980, Cunningham proposed a BMR prediction equation that used lean body mass as a variable instead of common factors such as weight, height, sex and age.⁽⁷¹⁾

Researchers have found significant differences result from the use of various equations to calculate energy needs. In a report published in 1985, Schofield conducts a review of the literature on basal metabolism and discusses attempts to predict BMR from age, sex and anthropometric measurements.⁽⁶⁹⁾ The comprehensive report notes that subjects from developing countries are small-

Factor	Effect	% of Change
Nutritional status	Starvation: Decrease	Up to 50%
Thyroid function	Increase or decrease	40- 100%
Genetics	Varies per kg of FFM	~ 11%
Gender	Decrease in females	~ 10% lower
Fever	Increase (per ° >98.6°F)	7%
Body size	Increase (with > wt./muscle)	~ 6%
Age	Decrease (per decade)	~ 2-3%
Symp nervous sys	Stress: Increase	Varies
Diet	Increased Protein: Increase	Varies
Menstrual cycle	Varies per cycle	Varies
Pregnancy	Increase	Varies
Lactation	Increase	Varies

TABLE 2. COMPONENTS OF ENERGY EXPENDITURE



CALORIES AND ENERGY NEEDS

(Continued from page 7)

er, have lower metabolic rates, and have lower rates per unit of weight than North American or European subjects. A study of seven smokers (9-29 cigarettes every day) disclosed measured 24 hour energy expenditure was significantly higher than predicted.⁽⁷⁹⁾ Another small but interesting project measured BMR, thyroid hormones and protein utilization in six men enrolled in a metabolic study.⁽⁸⁰⁾ Wada and King noted significantly decreased BMR's when subjects were fed a low zinc diet. Their results suggest an association between low zinc intakes and decreases in BMR.

Piers and others found that for Americans and North Europeans, the equations of Hayter and Henry, provided an accurate estimate of the measured BMR at the group level.⁽⁸¹⁾ Others report the regression equations of Owen and others, Fredrix and others, and the HBE, were most accurate in calculating BMR.⁽⁸²⁾ Chinese scientists developed predictive equations for BMR in healthy Chinese adults that use variables similar to the ones used in the HBE.⁽⁷⁶⁾ Henry and Rees presented a series of predictive equations, based on body weight, to estimate BMR in people living in the tropics.⁽⁷²⁾ Their equation revealed that the FAO/WHO/UNU predictive equations overestimated the BMR of people living in hot, humid areas. A recent study reports on the evaluation of 10 BMR equations compared to BMR measured by whole-body calorimetry.⁽⁵⁷⁾ Nine out of the ten equations overestimated BMR ranging from 15-176 kcals per day. Wong found that because of overestimation, significantly greater for African-Americans in six equations, ethnicity is an important factor in the estimation of BMR. Their final study results reveal that for individual female children and adolescents the current prediction equations are not suitable for accurate estimation of the BMR.

REE AND HIV

REE is consistently increased, inconsistently elevated, or decreased in patients living with HIV.^(83-86,9,13) Mulligan and others note the determinants of this variability in REE are not yet understood.⁽⁸⁷⁾ Elevated REE contributes to wasting and represents an insufficient adaptation to malnutrition.⁽⁸⁵⁾ Grunfeld points out that kcal restriction in HIV-negative people causes a decrease in REE that blunts the weight loss and preserves lean body mass.⁽⁵⁵⁾

Investigators found that in men living with HIV the elevation in REE continues in spite of decreased caloric intake.^(26, 17) Grunfeld and others measured REE, caloric intake, and the 28 day weight trend in HIV-positive and HIV-negative control subjects (group 1).⁽²²⁾ They found increased REE (11%) in the HIV-positive subjects without AIDS or secondary infections (group 2). AIDS patients without secondary infection (group 3) had a 25% increase in REE while the AIDS patients with secondary infection (group 4) had a 29% increase in REE. Caloric intake, similar in group 1, group 2, and group 3, was reduced by 36% in group 4 who consumed 17% fewer kcals than required to meet their REE. There was also a 5% decrease in average short-term weight in group 4. Investigators report that weight trend correlated with caloric intake but it did not correlate with REE. Grunfeld notes since the individuals in groups' two and three did not show short-term weight loss they were able to partially compensate for increased REE. Hommes and others, in the Netherlands, also found increased REE rates even without acute illness.⁽⁹⁾ In a recent study, Mulligan and colleagues from San Francisco found elevations in the REE of HIV-positive women that were comparable to those found in HIV-positive men.⁽¹³⁾ Another small study of ten asymptomatic HIV-positive women did not find a significant difference in REE and body composition between the two study groups.⁽⁸⁸⁾

A cross sectional study of 53 outpatients living with HIV noted an unpredictable RMR.^(84, 85) Suttman and others investigated REE and body composition in 60 clinically stable HIV-positive patients.⁽⁸⁵⁾ REE differed significantly from predicted values of the HBE in 40% of the group. As in a previous study, inconsistently increased REE rates were noted. Increased REE was evident during all clinical stages of the disease. Results of a 27 patient evaluation revealed weight-

"ELEVATED REE CONTRIBUTES TO WASTING AND REPRESENTS AN INSUFFICIENT ADAPTATION TO

losing patients showed a significantly increased REE during weight loss. Suttman and colleagues conclude elevated REE is not associ-

ated with clinical and laboratory parameters of immunodeficiency, but might happen during weight loss. Other researchers performed indirect calorimetry in 18 men to investigate whether increased REE might be responsible for HIV-related weight loss.⁽⁹⁾ They found elevated rates of REE in patients with progressed HIV infection and also note that increased REE may contribute to the weight loss in patients with AIDS or ARC.

Macallan and colleagues, in the U.K., performed assessments of energy metabolism in 27 HIV-challenged men.⁽¹⁷⁾ The group found TEE, measured by the doubly-labeled-water technique*, to be no more than that used by HIV-negative men. During episodes of weight loss TEE decreased mainly because of reduced physical activity. During acute disease, weight loss often correlates with the inability to further decrease voluntary activity to compensate for decreased intake.⁽⁵⁾ Grunfeld notes that decreased physical activity, because of lethargy and fatigue from illness, might contribute to the failure to rebuild lean body mass in HIV-positive individuals.⁽⁵⁵⁾ He says in

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GLOSSARY

ALKALOID: 1. Any of a class of organic compounds composed of carbon, hydrogen, nitrogen, and usually oxygen, that are often derived from plants. Alkaloids usually contain at least one nitrogen atom in a heterocyclic ring. They occur chiefly in many vascular plants and some fungi. The name means alkalilike, but some alkaloids do not exhibit alkaline (basic) properties. Many alkaloids have physiological effects and are known for their poisonous or medicinal attributes. Curarine, found in the deadly extract Curare, is a powerful muscle relaxant; atropine is used to dilate the pupils of the eye; and physostigmine is specific for certain muscular diseases. Narcotic alkaloids used in medicine include Morphine, Codeine, and Cocaine. Caffeine, LSD, quinine, serotonin, strychnine, and nicotine are some other common alkaloids.

ALTERNATIVE THERAPY: In Western countries, alternative therapy refers to any type of medicine that supplements or is used in lieu of biomedicine (i.e., conventional medicine) or allopathic medicine. In other parts of the world, where traditional medicine predominates, the term may refer to biomedicine itself.

BASAL METABOLIC RATE (BMR): Rate at which energy is used at complete rest. It is measured in humans by the heat given off per unit of time, and expressed as the calories released per kilogram of body weight or by square meter of body surface each hour. Can be measured by equations such as the Harris-Benedict or other methods used by indirect calorimetry.

BIOLOGICAL RESPONSE MODIFIERS (BRMs): Substances, either natural or synthesized, that boost, direct, or restore normal immune defenses. BRMs include interferons, interleukins, thymic hormones, and monoclonal antibodies.

BUYER'S CLUBS: Retailers who provide a variety of nutritional and medicinal items, or items said to have those properties, to people with HIV or AIDS. Some of these establishments are nonprofit in character; some are quasi-nonprofit, and some are openly commercial. Some offer advice, in verbal or printed form, or both, while some simply sell the products. Medications obtained from these entities may not be FDA-approved. Some sources say that buyer's clubs offer drugs that are either approved or effective.

CALORIMETRY: Measurement of energy.

CYCLASE: Enzyme that acts as a catalyst in the cyclization of a compound.

CYCLIC AMP: A cyclic nucleotide of

adenosine that acts at the cellular level as a regulator of various metabolic processes.

CYCLIC GMP: A cyclic nucleotide of guanosine thought to act at the cellular level as a regulator of various metabolic processes, possibly as an antagonist to cyclic AMP.

CYTOCHROME P450: One of the enzymes responsible for the oxidative metabolism of a wide number of compounds, including many medications.

CYTOCHROME: Any of a class of heme-containing proteins, in the mitochondria of plant and animal cells, that play a vital role in cellular respiration by alternately accepting and donating electrons in oxidation reactions.

CYTOSTATIC: Inhibiting or suppressing cellular growth and multiplication.

DOUBLY LABELED WATER TECHNIQUE: Uses $^2\text{H}_2$ and ^{18}O labeled water to measure energy expenditure in free-living subjects over a period of several weeks.

ELASTASE: Enzyme of pancreatic juice that catalyzes the hydrolysis of elastin (a protein similar to collagen that's the principal structural component of elastic fibers).

EUKARYOTE OR EUKARYOTE: A single-celled or multi-cellular organism whose cells contain a distinct membrane-bound nucleus.

GLYCOPROTEIN: Any of a group of conjugated proteins that contain a carbohydrate as the nonprotein component.

HOMEOSTASIS: The ability or tendency to maintain internal equilibrium by adjusting physiological processes.

IMMUNOSUPPRESSION OR IMMUNODEPRESSION: Suppression of the immune response that may be induced by drugs (chemotherapy) or radiation for the purpose of preventing the rejection of grafts or transplants. A result of HIV infection and may also be used to control autoimmune diseases.

IMMUNOTOXIN: Plant or animal poison that is attached to a monoclonal antibody and used to destroy a specific target cell.

INDIRECT CALORIMETRY: Measurement of energy expenditure that estimates metabolic rate from measurements of oxygen consumption and carbon dioxide production.

LYMPHOCYTE PROLIFERATION: The rapid growth of white blood cells that includes T-cells and B-lymphocytes.

MONOCLONAL ANTIBODY: Artificially produced antibody. Useful as tools for identifying specific protein molecules. (See biological response modifiers)

P24: Part of the core protein within the envelope of the HIV virus that surrounds the viral RNA. Increased p24 levels may indicate that HIV is actively replicating but this is now considered an inaccurate method to monitor viral activity.

REVERSE TRANSCRIPTASE: An enzyme (of HIV) that converts RNA into DNA, the form that carries genes necessary for viral replication.

STREPTOZOTOCIN: An antibiotic that's active against tumors but damaging to insulin-producing cells. It is now also regarded as a carcinogen.

SYNCYTIUM (PULRAL-SYNCYTIA): A mass of dysfunctional clumps formed by cell-to-cell fusion. HIV-infected cells may also fuse with uninfected cells, forming balloon-like giant cells known as syncytia. In vitro studies reveal these giant cells are associated with the death of uninfected cells. In the HIV-challenged the presence of syncytia-inducing variants of HIV has been correlated with rapid disease progression.

T4 (CD4) CELL: A subset of white blood cells that carry the T4 cell surface marker and help the body fight infection by coordinating much of the immune response. HIV invades T4 cells and destroys them.

T4 (CD4) COUNT: The number of T-helper lymphocytes, measured by cubic millimeter of blood. The T4 count is used as a predictor of immune health and a count of less than 200 qualifies as a diagnosis of AIDS.

TRYPsin: Enzyme of pancreatic juice. It hydrolyzes proteins to form smaller polypeptide units.

VIRAL BURDEN (Viral Load): The amount of HIV virus in the circulating blood. Monitoring a person's viral burden is important because of the apparent correlation between the amount of virus in the blood and the severity of the disease. Sicker patients generally have more virus than those with less advanced disease. A new, sensitive, rapid test-called the branched DNA assay for HIV-1 infection-can be used to monitor the HIV viral burden.

Resources Used For This Glossary

Glossary of HIV/AIDS -- CDC NAC: 800/458-5231

Energy Requirements. In: Brown ML, ed. *Present Knowledge in Nutrition*, Sixth Edition. Washington, D.C: International Life Sciences Institute- Nutrition Foundation; 1990.

The American Heritage® Dictionary of the English Language, Third Edition©. 1992. Houghton Mifflin Company. Microsoft Bookshelf©, 1987- 1995, Microsoft Corporation.

MEDIC -- HIV/AIDS TEXT DATABASE. Version 5.07T, June 1995. Edited by Jay Eastman. Friends Projects, Chowchilla California.



CALORIES AND ENERGY NEEDS

(Continued from page 8)

spite of elevated REE and metabolic disturbances most HIV-challenged patients maintain their weight.

HBE CALCULATIONS

Mulligan and others found that REE, measured by indirect calorimetry, ranged from 88-136 % of the value calculated by the HBE. (89) These researchers note the increase in REE among their subjects statistically correlates with increasing HIV viral loads. The men with the highest viral loads* had the highest REE. Belgium investigators used indirect calorimetry to study the metabolism of 25 HIV-positive patients, at all stages of HIV disease. (90) The researcher's comparison of measured REE and REE calculated by HBE found that the HBE overestimated REE in the control group yet underestimated REE in the patients with progressed HIV disease. Study results published in 1994 compared calculated energy need to measured energy consumption. (91) There were 20 HIV-positive subjects enrolled in the study. Energy requirements for the subjects were calculated using the HBE and measured by indirect calorimetry. Results suggest calculating energy expenditure for the HIV-challenged by using a formula like HBE consistently underestimates actual REE.

The clinician's determination of a sufficient kcal level is of the utmost importance for optimum nutritional health. We now know that several patient defined variables can affect the calculation of individual energy needs. Reported, and sometimes even documented, height and weight may not always be as accurate as when taken by the clinician during the nutrition assessment. Naturally, an accurate determination of body weight and body height results in a more accurate individual BMR prediction. As noted previously, reported total activity is also a major factor in the determination of energy needs. Activity levels are widely varied in people living with HIV so it's crucial that a complete nutritional assess-

ment, that includes exercise and activity habits, is completed before calculating individual energy needs. HIV-positive individuals with opportunistic infection and increased activity levels may need to limit time spent on energy-burning pursuits to avoid unnecessary weight loss. Occupation can account for 10-50% of the kcals burned each day. Once the BEE is determined the addition of injury and weight gain factors, if needed, will contribute to a caloric level that helps the patient to reach and maintain optimal nutritional status.

Currently there are no standard recommendations for the estimation of kcal needs for people living with the HIV. Considering information from a recent study one may wish to calculate the HBE according to a suggestion made by Bowers and others. This group from the Veterans Affairs Medical Center in Tucson, Arizona noted that although additional stress factors are applied to the HBE there is no stress factor for the HIV-challenged. (92) The group compared BEE to REE among HIV-positive and control patients to determine if a stress factor for HIV exists. There were 29 patients living with HIV and 10 HIV-negative controls enrolled in the study. Bower's group found that the HBE underestimates the energy needs of adults living with HIV by approximately 13%. They suggest clinicians consider adding a 1.13 stress factor when using the HBE to estimate energy requirements in HIV-positive individuals.

NOTED RECOMMENDATIONS

Although general caloric recommendations are common, we know that specific calculations are necessary to determine individual energy needs. Chlebowski and others advocate

increased target levels for energy intake. (93) In their study daily energy intake was calculated to be sufficient for weight maintenance based on 30 kcal per kg of UBW or ideal (desirable) body weight. Recommendations to estimate caloric needs are in table 3.

General recommendations to assist HIV-challenged individuals in maintaining body weight appear to be between 25- 50 kcals per kg of actual body weight. (94-100)

Additional kcals to enable weight gain may be added. Kristin Weaver (Clinical Research Coordinator and Nursing Director

of Gastrointestinal Nutrition Services at San Francisco General Hospital in 1994) noted caloric recommendations in an interview with AIDS Treatment News. (94) She relates that during non-stressful times people can "guesstimate" what their metabolic needs are by multiplying 30-35 kcals times their weight in kgs. Donna Tinnerello, founding member of the Nutritionists in AIDS Care, a New York group, uses a factor between 35 to 50 kcals per kg of body weight. (95) Others say individuals should consume between 17-20 kcals per pound of weight, plus a weight gain factor if necessary. (96) Silvana Vasquez, Clinical Dietitian at Mercy Hospital in Miami, Florida, multiplies 35-40 kcals per kg of body weight. (99) To obtain a more accurate number of kcals she adds injury and weight gain factors to her calculation. Working in the Special Immunology Services Department she has

"OCCUPATION CAN ACCOUNT FOR 10-50% OF THE CALORIES BURNED EACH DAY."

Source	Recommendation	Factor	Year
Weaver	Clinically Stable	30-35 kg	1994
Fields	Clinically Stable	13-16 lb	1994
Gorbach & Smigelski	Varies with need	17-20 lb	1996
Tinnerello	Varies with need	35-50 kg	1997
Vasquez	Clinically Stable	35-40 kg	1997

TABLE 3. RECOMMENDATIONS TO ESTIMATE CALORIC NEEDS




ALTERNATIVE FOCUS: BITTER MELON

(Continued from page 3)

They report that seed extracts from bitter melon have immunosuppressive properties. In their study α/β M decreased lymphocyte proliferation* and macrophage activity.

In vivo mouse experiments with an MC extract found that it possesses antimutagenic activity.⁽⁴⁶⁾ Lee-Huang and others announced the discovery of a new inhibitor of HIV from the seeds and fruits of the MC plant in 1990.⁽⁴⁷⁾ The compound, Momordica Anti-HIV Protein (MAP 30) is a basic protein that has HIV-inhibitory effects in the test tube. MAP 30 was shown to inhibit p24* protein expression, reverse transcriptase* activity, and syncytium* formation. The abortifacient effects of MC work by preventing the interaction of syncytial cells in the placenta and some note this mechanism might prevent cell-to-cell infection.⁽⁴⁾

Hong Kong researchers Ng and colleagues found alpha-Momorcharin enhanced the tumoricidal effect of mouse macrophages on abnormal mouse breast cells.⁽⁴⁸⁾ Others isolated α/β M from the seeds of MC and found the extract possesses three trypsin* and four elastase* inhibitory activities.⁽⁴⁹⁾ The amino acids of two trypsin inhibitors from the seeds of MC have been isolated and sequenced.⁽⁵⁰⁾ Immunotoxins* were prepared with three RIPs, including momordica, and linked to an artificially produced antibody that was directed against the CD30 antigen of human lymphocytes.⁽³⁰⁾ Bolognesi and others note that either the RIPs or the immunotoxins induced cellular suicide (apoptosis) in the CD30+ L540 cell line. Other investigators note MC trypsin inhibitor-II prolonged the prothrombin time of human plasma.⁽⁵¹⁾

At the Ninth International Conference on AIDS Lee-Huang reported that MAP30 exhibits potent activity against HIV-1 with little toxicity to uninfected cells and intact animals.⁽⁵²⁾ The capability of MAP30 to act on DNA and RNA substrates might be

related to its strong anti-HIV action. Lee-Huang and others note MAP 30 is capable of acting against stages of the viral life cycle such as acute infection and viral replication in chronically infected cells.⁽⁵⁴⁾ She presented another poster session on the anti-HIV activity of recombinant MAP 30 (rMAP 30) isolated from bitter melon.⁽⁸⁾ Lee-Huang reported rMAP 30 inhibits HIV-1 to the same extent as native MAP 30. In a 1995 article Bourinbaier and Lee-Huang reported on the use of MAP 30 to enhance weak HIV antagonists.⁽⁵³⁾ Their results propose that the use of MAP 30, in combination with relatively small doses of two weak HIV antagonists (dexamethasone and indomethacin), might improve the efficacy of anti-HIV therapy.⁽⁵³⁾

Another report published in 1995 notes Lee-Huang and others identified and cloned MAP 30 and Gelonium anti-HIV protein (GAP 31 from the Gelonium multiflorum plant).⁽⁵⁵⁾ Study results of the inhibition of HIV-1 integrase by these plant proteins imply that obstructing viral DNA integration may play a major role in the anti-HIV activity of MAP30 and GAP31. Considering information found at a National Institutes of Health (U.S. government) web site Sylvia Lee-Huang is named as the primary inventor of three patents.⁽⁵⁶⁾ Two relate to MC and the treatment of HIV infection. She notes MAP 30 may be purified from MC fruit or seed extracts or produced by recombinant DNA technology. The two patents related to MC were filed for in 1991 and 1994. Recently other researchers have demonstrated ribonuclease activity, and characterized the enzymatic mechanism of gamma-momorcharin, another RIP protein.^(57,58)

As you can see in vitro and in vivo rodent studies have been completed on the MC plant. Human research on the healing properties of MC and the fruit it bears are very limited. Much of the information available on bitter melon is offered

through a variety of sources that have reviewed the actual studies which have been conducted.^(2-4,7) According to one informative web site distributor bitter melon has a fan club that is located in California.⁽⁵⁾ Some members of this fan club supposedly have gone from HIV-positive to HIV-negative. Anecdotal reports of bitter melon therapy are relatively common with some users saying T4 cells* have increased and others reporting no benefit at all.^(2,3) Users note decreased anxiety, increased energy, better sleeping patterns and more stamina.⁽⁷⁾ Some have reported improved dermatitis, improved bowel movements and weight gain.⁽⁴⁾

The only documented in vivo human study of bitter melon and its' effect was accomplished by Zhang in 1992. Zhang, an oriental doctor in New York who specializes in alternative treatments, conducted this observational study and presented the results at an AIDS conference.⁽⁵⁹⁾ Preliminary study results were written up in the Journal of Naturopathic Medicine.⁽⁶⁰⁾ Zhang and Khanyile made an extract of MC by boiling it down and administered it daily to only six HIV-positive patients (orally or rectally). The researchers noted T4 and T8 counts "tended to normalize". They surmise that MC appears to be a very promising herbal remedy with low or no toxicity. The average increase in T4 cells, found in this HIV-positive study group, was not very significant. As noted by James, like many other alternative treatment studies, this study was not controlled or blinded.⁽⁶¹⁾ Benefits were reported as an improved sense of well being, increased energy level, and increased T4 cell levels. Zhang did not test the effect of bitter melon on other markers.

No follow-up study authored by Zhang appears to be published and subsequent studies are not catalogued in either

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ALTERNATIVE FOCUS: BITTER MELON

(Continued from page 11)

AIDSLINE or MEDLINE. Zhang is reported to have treated HIV-positive people with bitter melon.⁽⁷⁾ The physician is purported to have formulated an extracted, vacuum-dried powder that is made from the MC plant. This product is not widely available in the U.S. but produced by a Chinese traditional pharmaceutical factory in China. Several years ago proponents of bitter melon anticipated increased availability of

the product in America.⁽²⁾ Another bitter melon proponent was noted to be in contact with hundreds of people who were using the therapy.⁽⁷⁾ However, there does not appear to be any subsequent information on this proponent or the outcome of bitter melon usage in his followers. Majchrowicz relates that a doctor in California stopped following individuals who were using this treatment because of poor compliance and lack of results.⁽⁴⁾

HEPATIC EFFECTS

Tennekoon and colleagues studied the effect of MC on certain key hepatic enzymes using rats.⁽⁶²⁾ They administered oral doses of MC fruit juice and seed extracts for 30 days to ten out of 20 rats. The researchers found significantly elevated serum concentrations of gamma-glutamyl transferase and alkaline phosphatase after oral administration of fruit juice and the seed extracts. Study results reveal MC may contain hepatotoxins capable of causing cellular damage at the molecular level or the plant may have an enzyme inducing effect. Raza and others investigated the effects of oral

feeding of MC fruit juice on the hepatic cytochrome P450* and glutathione S-transferase (compound/drug-metabolizing enzymes) in the streptozotocin* (STZ) induced diabetic rat.⁽¹¹⁾ Three groups were in the study: control; diabetic; and bitter melon juice fed rats. Changes in hepatic drug-metabolizing enzyme activities in the STZ-induced diabetic rodents occurred.

Bourinbaiar and Lee-Huang recently examined the effect of MAP30 and GAP31 on the infection and replication of Herpes Simplex Viruses (HSV).⁽⁶³⁾ The investigators' results suggest these plant proteins may be useful for the therapy of HSV. Others also believe that MAP30 and GAP31 may be useful for the treatment of HSV.⁽⁶⁴⁾

FORMS

Users of this alternative treatment may buy the MC plant, fruit, extract, juice, capsule, or powder. A distributor's web site notes some individuals feel they cleanse the blood by supplementing their diets with brewed MC.⁽¹²⁾ One source notes the dried root comes in a suppository form.⁽¹⁾ Retention enemas are thought to be a more efficient route of administration and the liquid must be held inside until it is "completely absorbed".⁽⁴⁾ One reason given for this is that purportedly active components may be rendered ineffective by stomach acid if consumed. Users prepare the powder with 4-5 ounces of hot water and let it cool before infusing the potion into their rectum. Sources note that if blended bitter melon leaves are used for the retention enema they may need to be diluted with more water to 'lessen colon sensitivity'.⁽⁴⁾

Those that buy the bitter melon fruit can juice it, pickle it, or sprinkle the fruit on food eaten with the meal.⁽¹²⁾ Some individuals brew a tea using the vines and leaves of the entire plant. They may use the tea in combination with the fruit and seeds, administered as a retention enema.⁽²⁾ A popular newsletter among those living with HIV notes that most

people agreed a retention enema provides better results.⁽⁷⁾ Bitter melon capsules are the most popular form to obtain. They can be bought on the Internet or through importers, buyer's clubs*, a few health food stores or distributors. Some grocery stores in the Los Angeles area are said to sell bitter melon.⁽⁴⁾ Seeds are touted as the most cost-effective form available (see table 3). They are tan and oval and a one ounce package contains about 150 to 200 seeds.⁽¹⁰⁾

Few sources offer dosing suggestions. One web site distributor suggests users consume 2-10 of the 500 milligram capsules each day.⁽¹³⁾ The suggested amount of drink or enema is 12-16 ounces per day.⁽⁴⁾ Diarrhea and fevers are two adverse reactions mentioned as a result of this treatment. There are also anecdotal reports of body aches, insomnia, and headaches.

CAUTIONS

The purported abortifacient effects of MC make it clear that pregnant women should not use this treatment. Retention edemas should be avoided because enema therapies can cause damage to the rectal mucous membranes and create an imbalance of vitamins and minerals as well.⁽¹⁾ Some people caution potential users by noting that seed extracts from bitter melon are immunosuppressive.⁽²⁷⁾ The Seattle Treatment Education Project points out there is some controversy whether the digestive process may kill the three proteins that are said to produce a desired effect.⁽²⁾ Wild plants can be contaminated and consuming bitter melon tea may increase the risk of foodborne illness if inadequate food handling practices are followed. Differences in tea quality and potency are also important concerns. Users should refrigerate the bitter melon fruit or plant before and after processing.⁽⁴⁾

Product	Strength	Amount	Cost
Capsules	500 mgs	100	\$13-25
Extract	?	2 ounces	\$12.50
Leaf juice	?	8 ounces	\$10
Tea	?	4 ounces	\$14
Package of seeds		1 ounce	\$5

TABLE 3. BITTER MELON PRODUCT PRICES

(Continued on page 13)



ALTERNATIVE FOCUS: BITTER MELON

(Continued from page 12)

In 1993, the FDA sent a letter to several buyer's clubs noting that unapproved AIDS drugs may be unsafe. ⁽⁶⁵⁾ They are concerned about the lack of physician's involvement, sale of injectable products of unknown purity, sterility, and strength, and promotion and commercialization of products that are unproven and potentially dangerous. It is important to stress that successful in vitro studies do not prove that MC or the fruit it bears have any value in real life conditions. Many treatments and drugs that appear effective in vitro are not successful in humans. ⁽¹⁾

Special Note: Due to the U.S. Dietary Supplement Health and Education Act of 1994 many supplements can be sold without a prescription. The fact that one can buy products like bitter melon should not be misconstrued to mean these products are safe or effective. Readers are cautioned to read all available research personally, and to consult with a physician, before making health care or treatment decisions.

Bibliography

- Momordica charantia. MEDIC -- HIV/AIDS Text Database. Version 5.08T. Produced by the Friends Projects, Chowchilla, CA. August 1995.
- Momordica charantia - Bitter Melon. Fact Sheet, Seattle Treatment Education Project. 1992 June. World Wide Web: <http://www.thebody.com/step/melon.html> (accessed 1 Aug 1997).
- Scott-Hartland B. Common Alternative Therapies: Bitter Melon (MAP-30). Treatment Issues, Newsletter. 1993/1994 Winter. Vol. 7, No. 11/12. World Wide Web: <http://www.aegis.com/aegis/pubs/gmhc/gmhc1993/GM071106.html> (accessed 1 Aug 1997).
- Majchrowicz MA. Bitter melon. Jon Greenburg Library of Alternative Therapies for HIV/AIDS, Fact Sheet. 1994 Spring. Internet: Rockville, MD:NAC, CDC Online, distributors (accessed 7 Sept 1994).
- Where's The Bitter? Astral-Natural, Newsletter. World Wide Web: <http://home.earthlink.net/~lsnatural/Bittermelon.html> (accessed 1 Aug 1997).
- Bitter Melon. Plant Protein Useful For Treating Tumors And HIV Infection. World Wide Web: <http://www.nih.gov/od/ott/8-277283.htm> (accessed 28 June 1997).
- Levine L. The emergence of bitter melon in the western world. Being Alive, Newsletter. 1992 June. World Wide Web: <http://gopher.hivnet.org:70/0/magazines/alve/ba926> (accessed 15 Aug 1997).
- Lee-Huang S, Bourinbaiar A, Chen HC, Huang P, et al. The anti-HIV activity of recombinant MAP 30 from bitter melon. Int Conf AIDS. 1994 Aug 7-12;10(1):35 (abstract no. 114A).
- James J. Traditional Treatment Tried for AIDS. AIDS Treatment News--International Edition, Newsletter. 1992 July. No. 155, p. 1. World Wide Web: <http://aegis.com> (accessed 28 Aug 1997).
- Johnson Jr. H, Myers C. Bitter Melon. 1991 Feb. World Wide Web: <http://pubweb.ucdavis.edu/documents/coopext/bitterm.htm> (accessed 1 Aug 1997).
- Raza H, Ahmed I, Lakhani MS, Sharma AK, et al. Effect of bitter melon (Momordica charantia) fruit juice on the hepatic cytochrome P450-dependent monooxygenases and glutathione S-transferases in streptozotocin-induced diabetic rats. Biochem Pharmacol 1996;52(10):1639-1642.
- Roots & Culture dialogue. Sittie River Red Hill Limited, Saint Paul, MN. World Wide Web: <http://www.phytotherapeutic.com/sorosi.htm> (accessed 1 Aug 1997).
- Asian Medicine: Tibetan, TCM and More. Eastwest Emporium, Charlottesville, VA. World Wide Web: http://www.lapage.com/eastwest/text3.htm#ax_Bitter_Melon (accessed 1 Aug 1997).
- Nutritional Consultation. L & S Natural, Inc., Los Angeles, CA. World Wide Web: <http://home.earthlink.net/~lsnatural/Consult.html> (accessed 1 Aug 1997).
- Clafin AJ, Vesely DL, Hudson JL, Bagwell CB, et al. Inhibition of growth and guanylate cyclase activity of an undifferentiated prostate adenocarcinoma by an extract of the balsam pear (Momordica charantia abbreviata). Proc Natl Acad Sci U S A. 1978;75(2):989-93.
- Lin JY, Hou MJ, Chen YC. Isolation of toxic and non-toxic lectins from the bitter pear melon Momordica charantia Linn. Toxicon. 1978;16(6):653-660.
- The American Heritage® Dictionary of the English Language, Third Edition*. 1992. Houghton Mifflin Company. Microsoft Bookshelf, Microsoft Corporation. 1987-1995.
- Horejsi V, Ticha M, Novotny J, Kocourek J. Studies on lectins. XLVII. Some properties of D-galactose binding lectins isolated from the seeds of Butea frondosa, Erythrina indica and Momordica charantia. Biochim Biophys Acta. 1980;623(2):439-48.
- Barbieri L, Zamboni M, Lorenzoni E, Montanaro L, et al. Inhibition of protein synthesis in vitro by proteins from the seeds of Momordica charantia (bitter pear melon). Biochem J. 1980;186(2):443-452.
- Falasca A, Gasperi-Campani A, Abbondanza A, Barbieri L, Stirpe F. Properties of the ribosome-inactivating proteins gelonin, Momordica charantia inhibitor, and dianthins. Biochem J. 1982;207(3):505-9.
- Alpha-Momorcharin. The Claremont Colleges. World Wide Web: <http://enzyme.claremont.edu/chem/courses/biochem/studentFolders/Tran/kTran.html> (accessed 1 Aug 1997).
- Neumann GM, Condron R, Polya GM. Purification and sequencing of napin-like protein small and large chains from Momordica charantia and Ricinus communis seeds and determination of sites phosphorylated by plant Ca(2+)-dependent protein kinase. Biochim Biophys Acta. 1996;1298(2):223-240.
- Amorim CZ, Marques AD, Cordeiro RS. Screening of the antimalarial activity of plants of the Cucurbitaceae family. Mem Inst Oswaldo Cruz. 1991;86 Suppl 2:177-80.
- Chan WY, Tam PP, Yeung HW. The termination of early pregnancy in the mouse by beta-momorcharin. Contraception. 1984;29(1):91-100.
- Ng TB, Chan WY, Yeung HW. Proteins with abortifacient, ribosome inactivating, immunomodulatory, antitumor and anti-AIDS activities from Cucurbitaceae plants. Gen Pharmacol. 1992;23(4):579-90.
- Aguwa CN, Mittal GC. Abortifacient effects of the roots of Momordica angustisepala. J Ethnopharmacol. 1983;7(2):169-73.
- Leung SO, Yeung HW, Leung KN. The immunosuppressive activities of two abortifacient proteins isolated from the seeds of bitter melon (Momordica charantia). Immunopharmacology. 1987;13(3):159-171.
- Takemoto DJ, Jilka C, Kresie R. Purification and characterization of a cytostatic factor from the bitter melon Momordica charantia. Prep Biochem. 1982;12(4):355-375.
- Sarkar S, Pranava M, Marita R. Demonstration of the hypoglycemic action of Momordica charantia in a validated animal model of diabetes. Pharmacol Res. 1996;33(1):1-4.
- Bolognesi A, Tazzari PL, Olivieri F, Polito L, et al. Induction of apoptosis by ribosome-inactivating proteins and related immunotoxins. Int J Cancer. 1996;68(3):349-55.
- Cakici I, Hurmoglu C, Tunctan B, Abacioglu N, et al. Hypoglycaemic effect of Momordica charantia extracts in normoglycaemic or cyproheptadine-induced

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learned from experience that this method usually provides enough kcals to meet or exceed nutrient needs. One well-known clinician, Cade Fields-Gardner, notes that general guidelines recommend a minimum daily intake of 16 kcals for each pound of baseline weight before infection or wasting (for men).⁽⁹⁷⁾ Women need fewer kcals, between 13-14, for each pound of weight.⁽¹⁰¹⁾ Data from an Australian study of parenteral nutrition, in 20 acutely ill AIDS patients, suggests that more than 50 kcals per kilogram are needed each day.⁽⁹⁸⁾

In America the HBE is the most commonly used tool to calculate BEE. HBE incorporates gender, weight, height, and age as primary variables.⁽⁷⁰⁾ Additional activity and stress factors are applied to the HBE to better determine individual caloric requirements. Kristin recommends using the HBE to calculate energy needs when an opportunistic infection occurs.⁽⁹⁴⁾ Many clinicians like Fenton, HIV Nutrition Advocate for AIDS Project Los Angeles, use the HBE to determine BEE then add activity and stress factors.⁽¹⁰²⁾ Based on the information provided by Anderson and Bowers it may be wise to consider adding a 1.13 stress factor when using HBE to calculate energy needs.^(91,92) Using all the above methods to determine total energy needs can result in a difference of more than 500 kcals. Hopefully, a standard guideline will be chosen soon to determine the energy needs of people with HIV.

Results from a prospective study of 108 HIV-positive patients, at all stages of disease, found that body weight progressively decreased in spite of dietary counseling and continued maintenance of energy intake.⁽⁹³⁾ Yet, with the use of nutritional services other studies have documented significant increases in the intake of most nutrients.^(103, 104) Many clinicians advocate early nutrition assessment and intervention in the course of HIV disease.^(3, 12, 84, 93, 95, 103, 105, 106) A nutritional status assessment with caloric

guidelines is essential at all stages of HIV to gauge the nutritional factors that may be contributing to a decreased quality of life. Diminished caloric intake is one identifiable and reversible cause of body weight loss that can often be controlled. Clinicians can help improve the intake of kcals by providing people with the educational tools that they need to avoid unnecessary weight loss and decrease the incidence of secondary infection.

It is uncertain whether nutritionally aware HIV-challenged individuals can or are able to maintain adequate body weight throughout HIV disease. However, a well-educated person has a much better chance of meeting nutrient needs with the consumption of a diet that fulfills total energy requirements. Armed with adequate and appropriate knowledge of their nutritional needs HIV-challenged individuals are more able to participate in and improve their health care and quality of life.

Bibliography

1. Keusch GT, Thea DM. Malnutrition in AIDS. *Med Clin North Am.* 1993;77(4): 795-814.
2. Fields-Gardner C. A review of mechanisms of wasting in HIV disease. *Nutr Clin Pract.* 1995;10(5):167-76.
3. Crocker KS. Gastrointestinal manifestations of the acquired immunodeficiency syndrome. *Nurs Clin North Am.* 1989; 24(2):395-406.
4. Chlebowski R, Grosvenor M, Kruger S, Tai V, Beall G. Dietary intake, nutritional status, and immunologic function in patients with HIV infection. *Int Conf AIDS* (6th). 1990 Jun 20-23;6(1):168 (abstract no. Th.B.202).
5. Kotler DP. Wasting Syndrome: New Concepts in Pathogenesis, Evaluation and Management. *Clinical Care Options for HIV Online Journal.* 1996 July, Vol. 2, No. 2. World Wide Web: <http://www.healthcg.com/> (accessed 17 July 1997).
6. Kotler DP, Wang J, Pierson RN. Body composition studies in patients with the acquired immunodeficiency syndrome. *Am J Clin Nutr.* 1985;42:1253-1265.
7. Ysseldyke LL. Nutritional complications and incidence of malnutrition among AIDS patients. *Am Diet Assoc.* 1991;91(2):217-218.
8. Von Roenn JH, Roth EL, Craig R. HIV-related cachexia: potential mechanisms and treatment. *Oncology.* 1992;49 Suppl 2:50-4.
9. Hommes MJ, Romijn JA, Godfried MH, Schattenkerk JK, et al. Increased resting energy expenditure in human immunodeficiency virus- infected men. *Metabolism.* 1990;39(11):1186-90.
10. Von Roenn JH. Management of HIV-related bodyweight loss. *Drugs.* 1994;47(5):774-83.
11. Trujillo EB, Borlase BC, Bell SJ, Guenther KJ, et al. Assessment of nutritional status, nutrient intake, and nutrition support in AIDS patients. *J Am Diet Assoc.* 1992;92(4):477-8.
12. Hecker LM, Kotler DP. Malnutrition in patients with AIDS. *Nutr Rev.* 1990;48(11):393-401.
13. Mulligan K, Tai VW, Greenblatt R, Schambelan M. Body Composition And Resting Energy Expenditure In Women With HIV Infection. *Int Conf AIDS* (11th). 1996 Jul 7-12;11(2):132 (abstract no. Mo.B.1389).
14. Ott M, Lambke B, Fischer H, et al: Early changes of body composition in human immunodeficiency virus-infected patients: tetrapolar body impedance analysis indicates significant malnutrition. *Am J Clin Nutr.* 1993;57:15.
15. Drolet C, Reaidi GB, Taggart ME, Reidy M. Nutritional status of HIV-infected patients: anthropometric, biochemical and dietetic methods for clinical assessment of nutritional status. *Int Conf AIDS* (9th). 1993 Jun 6-11;9(1):529 (abstract no. PO-B36-2366).
16. Di Franco MG, Woods M, Spiegelman D, Knox T, Gorbach S. Nutritional correlates with CD4 counts in HIV-infected individuals. *Int Conf AIDS* (11th). 1996 Jul 7-12;11(2):102 (abstract no. We.B.3265).
17. Macallan DC, Noble C, Baldwin C, Jebb SA, et al. Energy expenditure and wasting in human immunodeficiency virus infection. *N Engl J Med.* 1995;333(2):83-8.
18. Graham CS, Graham BG, Bartlett JA, Heald AE, Schiffman SS. Taste and smell losses in HIV infected patients. *Physiol Behav.* 1995;58(2): 287-93.
19. Summerbell CD, Youle M, McDonald V, Catalan J, Gazzard BG. Megestrol acetate vs cyproheptadine in the treatment of weight loss associated with HIV infection. *Int J STD AIDS.* 1992;3(4):278-80.
20. Isaksson B. How to avoid malnutrition during hospitalization? *Hum Nutr Appl Nutr.* 1982; 36(5):367-373.
21. Edens NK, Gil KM, Elwyn DH. The effects of varying energy and nitrogen intake on nitrogen balance, body composition, and metabolic rate. *Clin Chest Med.* 1986;7(1):3-17.
22. Grunfeld C, Pang M, Shimizu L, Shigenaga JK, et al. Resting energy expenditure, caloric intake, and short-term

(Continued on page 16)




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(Continued from page 13)

- hyperglycaemic mice. *J Ethnopharmacol.* 1994;44(2):117-21.
32. Karunanayake EH, Welihinda J, Sirimanne SR, Sinnadorai G. Oral hypoglycaemic activity of some medicinal plants of Sri Lanka. *J Ethnopharmacol.* 1984;11(2):223-31.
33. Leatherdale BA, Panesar RK, Singh G, Atkins TW, et al. Improvement in glucose tolerance due to *Momordica charantia* (karela). *Br Med J (Clin Res Ed).* 1981;282(6279):1823-4.
34. Welihinda J, Arvidson G, Gylfe E, Hellman B, Karlsson E. The insulin-releasing activity of the tropical plant *momordica charantia*. *Acta Biol Med Ger.* 1982;41(12):1229-40.
35. Cunnick JE, Sakamoto K, Chapes SK, Fortner GW, Takemoto DJ. Induction of tumor cytotoxic immune cells using a protein from the bitter melon (*Momordica charantia*). *Cell Immunol.* 1990;126(2):278-289.
36. Ho WK, Liu SC, Shaw PC, Yeung HW, et al. Cloning of the cDNA of alpha-momorcharin: a ribosome inactivating protein. *Biochim Biophys Acta.* 1991;1088(2): 311-314.
37. Porro G, Bolognesi A, Caretto P, Gromo G, et al. In vitro and in vivo properties of an anti-CD5-momordin immunotoxin on normal and neoplastic T lymphocytes. *Cancer Immunol Immunother.* 1993;36(5):346-50.
38. Porro G, Lento P, Marcucci F, Gromo G, Modena D. Different cytotoxic activity and intracellular fate of an anti-CD5-momordin immunotoxin in normal compared to tumour cells. *Cancer Immunol Immunother.* 1995;40(4):213-218.
39. Foa-Tomasi L, Campadelli-Fiume G, Barbieri L, Stirpe F. Effect of ribosome-inactivating proteins on virus-infected cells. Inhibition of virus multiplication and of protein synthesis. *Arch Virol.* 1982;71(4):323-32.
40. Spreafico F, Malfiore C, Moras ML, Marmonti L, et al. The immunomodulatory activity of the plant proteins *Momordica charantia* inhibitor and pokeweed antiviral protein. *Int J Immunopharmacol.* 1983;5(4):335-43.
41. Jilka C, Striffler B, Fortner GW, Hays EF, Takemoto DJ. In vivo antitumor activity of the bitter melon (*Momordica charantia*). *Cancer Res.* 1983;43(11):5151-5155.
42. Takemoto DJ, Dunford C, McMurray MM. The cytotoxic and cytostatic effects of the bitter melon (*Momordica charantia*) on human lymphocytes. *Toxicol.* 1982;20(3):593-599.
43. Takemoto DJ, Dunford C, Vaughn D, Kramer KJ, et al. Guanylate cyclase activity in human leukemic and normal lymphocytes. Enzyme inhibition and cytotoxicity of plant extracts. *Enzyme.* 1982;27(3):179-188.
44. Takemoto DJ, Kresie R, Vaughn D. Partial purification and characterization of a guanylate cyclase inhibitor with cytotoxic properties from the bitter melon (*Momordica charantia*). *Biochem Biophys Res Commun.* 1980;94(1):332-339.
45. Takemoto DJ, Jilka C, Rockenbach S, Hughes JV. Purification and characterization of a cytostatic factor with anti-viral activity from the bitter melon. *Prep Biochem.* 1983;13(4):371-393.
46. Guevara AP, Lim-Sylianco C, Dayrit F, Finch P. Antimutagens from *Momordica charantia*. *Mutat Res.* 1990;230(2):121-6.
47. Lee-Huang S, Huang PL, Nara PL, Chen HC, et al. MAP 30: a new inhibitor of HIV-1 infection and replication. *Fed Euro Bio Soc Lett.* 1990;272(1-2):12-8.
48. Ng TB, Liu WK, Sze SF, Yeung HW. Action of alpha-momorcharin, a ribosome inactivating protein, on cultured tumor cell lines. *Gen Pharma.* 1994;25(1):75-7.
49. Porro G, Bonardi MA, Giovanetti E, Lento P, Modena D. Production and characterization of monoclonal antibodies against the ribosome inactivating proteins dianthin32 and momochin. *Hybridoma.* 1994;13(2):99-105.
50. Miura S, Funatsu G. Isolation and amino acid sequences of two trypsin inhibitors from the seeds of bitter melon (*Momordica charantia*). *Biosci Biotechnol Biochem.* 1995;59(3):469-73.
51. Hayashi K, Takehisa T, Hamato N, Takano R, et al. Inhibition of serine proteases of the blood coagulation system by squash family protease inhibitors. *J Biochem (Tokyo).* 1994;116(5):1013-18.
52. Lee-Huang S, Chen HC, Kung HF, Huang PL, Huang PL. MAP30, an anti-HIV protein, inhibits both ribosomal RNA function and DNA topological interconversions. *Int Conf AIDS.* 1993 Jun 6-11;9(1):467 (abstract no. PO-B26-1993).
53. Bourinbaiar AS, Lee-Huang S. Potentiation of anti-HIV activity of anti-inflammatory drugs, dexamethasone and indomethacin, by MAP30, the antiviral agent from bitter melon. *Biochem Biophys Res Commun.* 1995;208(2):779-785.
54. Lee-Huang S, Huang PL, Chen HC, Huang PL, et al. Anti-HIV and anti-tumor activities of recombinant MAP30 from bitter melon. *Gene.* 1995;161(2):151-156.
55. Lee-Huang S, Huang PL, Huang PL, Bourinbaiar AS, et al. Inhibition of the integrase of human immunodeficiency virus (HIV) type 1 by anti-HIV plant proteins MAP30 and GAP31. *Proc Natl Acad Sci.* 1995;92(19):8818-22.
56. Patent No. 5,484,889. Plant Protein Useful For Treating Tumors And HIV Infection. U.S. Patent Database, N.I.H. site. World Wide Web: <http://www.nih.gov/od/ott/8-277283.htm> (accessed 1 Aug 1997).
57. Mock JW, Ng TB, Wong RN, Yao QZ, et al. Demonstration of ribonuclease activity in the plant ribosome-inactivating proteins alpha- and beta-momorcharins. *Life Sci.* 1996;59(22):1853-9.
58. Pu Z, Lu BY, Liu WY, Jin SW. Characterization of the enzymatic mechanism of gamma-momorcharin, a novel ribosome-inactivating protein with lower molecular weight of 11,500 purified from the seeds of bitter melon (*Momordica charantia*). *Biochem Biophys Res Commun.* 1996;229(1):287-94.
59. Zhang Q, Khanyile C. Primary report on the use of Chinese herbal extract of *momordica charantia* bitter melon in HIV infected pts. *Int Conf AIDS (8th).* 1992 Jul 19-24;8(3):148 (abstract no. PuB 7597).
60. Zhang QC. Preliminary report on the use of *Momordica charantia* extract by HIV patients. *Jrn Nat Med.* 1992;3(1):65-69.
61. James J. Clinical Trials and Observational Studies. *AIDS Treatment News, Newsletter.* 1992 Aug. No. 157. Internet: Rockville, MD:NAC, CDC Online, distributors (accessed 19 Jan 1995).
62. Tennekoon KH, Jeevathayaparan S, Angunawala P, Karunanayake EH, Jayasinghe KS. Effect of *Momordica charantia* on key hepatic enzymes. *J Ethnopharmacol.* 1994;44(2):93-7.
63. Bourinbaiar AS, Lee-Huang S. The activity of plant-derived antiretroviral proteins MAP30 and GAP31 against herpes simplex virus in vitro. *Biochem Biophys Res Commun.* 1996;219(3):923-9.
64. Ueno HM, Doyama JT, Padovani CR, Salata E. Effect of *Momordica charantia* L. in mice infected with *Plasmodium berghei*. *Rev Soc Bras Med Trop.* 1996;29(5):455-60.
65. Schwartz J. Issues Warning About AIDS Drugs From 'Buyers Clubs'. *Washington Post, Newspaper.* 1993 May 26, p. A3. Internet: Rockville, MD:NAC, CDC Online, distributors (accessed 19 Jan 1995).



CALORIES AND ENERGY NEEDS

(Continued from page 14)

- weight change in human immunodeficiency virus infection and the acquired immunodeficiency syndrome. *Am J Clin Nutr.* 1992;55(2):455-60.
23. Gelas P, Saint-Marc T, eds. Proceedings of the First International Conference on Nutrition and HIV Infection. 1995.
24. Sachs KM. Nutrition for in-home AIDS patients. *Caring.* 1996;15(8):36-8.
25. Scrimshaw NS. Effect of infection on nutritional status. *Proc Natl Sci Counc Repub China.* 1992;16(1):46-64.
26. Grunfeld C, Kotler DP, Hamadeh R, Tierney A, et al. Hypertriglyceridemia in the acquired immunodeficiency syndrome. *Am J Med.* 1989;86:27-31.
27. Grunfeld C, Feingold KR. Body weight as essential data in the management of patients with human immunodeficiency virus infection and the acquired immunodeficiency syndrome. *Am J Clin Nutr.* 1993;58:317-8.
28. Kotler DP, Tierney D, Wang J, Pierson RN. Magnitude of body cell mass depletion and the timing of death from wasting in AIDS. *Am J Clin Nutr.* 1989;50:444-447.
29. Timbo BB, Tollefson L. Nutrition: a cofactor in HIV disease. *J Am Diet Assoc.* 1994; 94(9):1018-1022.
30. Dent DL, Langhamp-Henken B, Kudsk KA. Nutrition and the immune system. In: Kirby DF, Dudrick SJ, eds. *Practical Handbook of Nutrition in Clinical Practice.* Boca Raton, Fla: CRC Press; 1994:65-85.
31. Palenicek JG, Graham NMH, He YH, et al. Weight loss prior to clinical AIDS as a predictor of survival. *J Acquir Immunodef Syndr.* 1995;10:366.
32. Suttman U, Ockenga O, Hoogstraal L, et al. Incidence and prognostic value of malnutrition and wasting in human immunodeficiency virus-infected outpatients. *J Acquir Immunodef Syndr.* 1995;8:239.
33. Beisel WR. Nutrition in pediatric HIV infection: setting the research agenda. Nutrition and immune function: overview. *J Nutr.* 1996;126(10 Suppl):2611S-2615S.
34. Harbige LS. Nutrition and immunity with emphasis on infection and autoimmune disease. *Nutr Health.* 1996;10:285-312.
35. Whitney EN, Hamilton EMN. Metabolism: feasting, fasting, and energy balance. In: Smith R, ed. *Understanding Nutrition*, Second Edition. St. Paul, Minnesota: West Publishing Company; 1981:233-234.
36. Wilmore DW. Growth Hormone Promotes Protein Anabolism and Recovery. Presentation at the Annual Meeting of the Florida Dietetic Association, Marco Island, FL. July 1997.
37. Edimo ME, Afane Ze, Zekeng L, Kembou E, Kaptue L. Tuberculosis (TB), HIV and nutrition in Yaounde - Cameroon. *Int Conf AIDS (11th).* 1996 Jul 7-12;11(2):273 (abstract no. Th.B.4128).
38. Kraak V, Stricker JD, Utermohlen V. Determining the nutrition needs of an ethnically diverse urban population with HIV/AIDS. *Int Conf AIDS (10th).* 1994 Aug 7-12;10(2):226 (abstract no. PB0916).
39. Oral health for people with HIV infection. *NYDH AIDS Inst.* 1995 June:1-5.
40. Durham TM, Hodges ED, Swindels S, Green JG. Facial nerve paralysis related to HIV disease. Case report and dental considerations. *Oral Surg Oral Med Oral Pathol.* 1993;75(1):37-40.
41. Summerbell C. Appetite and nutrition in relation to human immunodeficiency virus (HIV) infection and acquired immunodeficiency virus syndrome (AIDS). *Proc Nutr Soc.* 1994;53(1): 139-50.
42. Fighting fatigue requires battle on many fronts. *AIDS Alert, Newsletter.* 1996;11(10): suppl 1-2.
43. Heald AE, Schiffman SS. Taste and smell. Neglected senses that contribute to the malnutrition of AIDS. *N C Med J.* 1997;58(2): 100-4.
44. Knapp HR. Nutrient-Drug Interactions. In: Brown ML, ed. *Present Knowledge in Nutrition*, Sixth Edition. Washington, D.C: International Life Sciences Institute-Nutrition Foundation; 1990:451-456.
45. Beach RS, Mantero-Atienza E, Fordyce-Baum MK. Dietary supplementation in HIV infection. *FASEB J.* 1988;2:A1435.
46. Kubena KS, McMurray DN. Nutrition and the immune system: A review of nutrient-nutrient interactions. *J Am Diet Assoc.* 1996;96(11):1156-1164.
47. International Conference On Nutrition: Nutrition and development - a global assessment - 1992. Chapter two: Factors influencing nutritional status. PENpages: College of Agricultural Sciences, The Pennsylvania State Nutrition Center. Document No. 121011074. World Wide Web: <http://www.penpages.psu.edu/penpages%5Freference/12101/121011074.html> (accessed 5 Sept 1997)
48. Meyer SA. The weight status of HIV-challenged people. Presentation at the 1997 AIDS Meals Provider's Conference, Miami Beach, FL. September 1997.
49. Hogg RS, Zadra JN, Chan-Yan C, Voigt R, et al. Analysis of nutritional intake in a cohort of homosexual men. *J Acquir Immune Defic Syndr Hum Retrovirol.* 1995;9(2):162-7.
50. Santolaria-Fernandez FJ, Gomez-Sirvent JL, Gonzalez-Reimers CE, Batista-Lopez JN, et al. Nutritional assessment of drug addicts. *Drug Alcohol Depend.* 1995;38(1):11-8.
51. Luder E, Godfrey E, Godbold J, Simpson DM. Assessment of nutritional, clinical, and immunologic status of HIV-infected, inner-city patients with multiple risk factors. *J Am Diet Assoc.* 1995;95(6):655-60.
52. Dworkin BM, Wormser GP, Axelrod F, Pierre N, et al. Dietary intake in patients with acquired immunodeficiency syndrome (AIDS), patients with AIDS-related complex, and serologically positive human immunodeficiency virus patients: correlations with nutritional status. *J Parenter Enteral Nutr.* 1990;14(6):605-9.
53. Meyer SA. The weight status of people living with HIV. Poster presentation at the Annual Meeting of the Florida Dietetic Association, Marco Island, FL. July 1997.
54. Energy Requirements. In: Brown ML, ed. *Present Knowledge in Nutrition*, Sixth Edition. Washington, D.C: International Life Sciences Institute- Nutrition Foundation; 1990:1-6.
55. Grunfeld C. What Causes Wasting in AIDS? *N Engl J Med.* 1995;333(2). World Wide Web: <http://www.nejm.org/> (accessed 3 Aug 1997).
56. Verboeket-van de Venne WP, Westerterp KR, Kester AD. Effect of the pattern of food intake on human energy metabolism. *Br J Nutr.* 1993;70(1):103-115.
57. Wong WW, Butte NF, Hergenroeder AC, Hill RB, et al. Are basal metabolic rate prediction equations appropriate for female children and adolescents? *J Appl Physiol.* 1996;81(6):2407-2414.
58. Bafitis H, Sargent F. Human physiological adaptability through the life sequence. *J Gerontol.* 1977;32(4):402-410.
59. Roubenoff R, Skolnik P, Knox T, Abad L, et al. Determinants of metabolic rate and body composition in adults with HIV infection. *Int Conf AIDS (11th).* 1996 Jul 7-12;11(1):123 (abstract no. Mo.B.1393).
60. Ravussin E, Lillioja S, Anderson TE, et al. Determinants of 24-hour energy expenditure in man: methods and results using a respiratory chamber. *J Clin Invest.* 1986;40:153-158.
61. Worthington- Roberts BS. Diet and athletic performance. In: *Contemporary Developments in Nutrition*. St. Louis, Missouri: The C.V. Mosby Company; 1981. P. 564.
62. Sjodin AM, Forslund AH, Westerterp KR, Andersson AB, et al. The influence of physical activity on BMR. *Med Sci Sports Exerc.* 1996;28(1):85-91.
63. Hunger and Appetite. In: Brown ML, ed. *Present Knowledge in Nutrition*, Sixth Edition. Washington, D.C: International Life Sciences Institute- Nutrition Foundation; 1990. P. 17.

(Continued on page 19)



CALORIES AND ENERGY NEEDS

(Continued from page 16)

64. Bouchard C, Perusse L, Deriaz O, Despres JP, Tremblay A. Genetic influences on energy expenditure in humans. *Crit Rev Food Sci Nutr.* 1993;33(4,5):345-350.
65. Kinabo JL, Durmin JV. Thermic effect of food in man: effect of meal composition, and energy content. *Br J Nutr* 1990;64(1):37-44.
66. Poizot-Martin I, Benourine K, Philibert P, Boulet JM, et al. Diet-induced thermogenesis in HIV infection. *AIDS.* 1994;8(4):501-4.
67. Henriksson J. The possible role of skeletal muscle in the adaptation to periods of energy deficiency. *Eur J Clin Nutr.* 1990;44 Suppl 1:55-64.
68. Soares MJ, Kulkarni RN, Piers LS, Vaz M, Shetty PS. Energy supplementation reverses changes in the basal metabolic rates of chronically undernourished individuals. *Br J Nutr.* 1992;68(3):593-602.
69. Schofield WN. Predicting basal metabolic rate, new standards and review of previous work. *Hum Nutr Clin Nutr.* 1985;39 Suppl 1:5-41.
70. Harris JA, Benedict FG. Biometric studies of basal metabolism in man. Washington, DC: Carnegie Institute of Washington; 1919. Publication 297.
71. Cunningham JJ. A reanalysis of the factors influencing basal metabolic rate in normal adults. *Am J Clin Nutr.* 1980;33(11):2372-2374.
72. Henry CJ, Rees DG. New predictive equations for the estimation of basal metabolic rate in tropical peoples. *Eur J Clin Nutr.* 1991;45(4):177-185.
73. Soares MJ, Francis DG, Shetty PS. Predictive equations for basal metabolic rates of Indian males. *Eur J Clin Nutr.* 1993;47(6):389-394.
74. Hayter JE, Henry CJ. A re-examination of basal metabolic rate predictive equations: the importance of geographic origin of subjects in sample selection. *Eur J Clin Nutr.* 1994;48(10):702-707.
75. Alfaro MP, Siegel RM, Baker RC, Heubi JE. Resting energy expenditure and body composition in pediatric HIV infection. *Pediatr AIDS HIV Infect.* 1995;6(5):276-80.
76. Liu HY, Lu YF, Chen WJ. Predictive equations for basal metabolic rate in Chinese adults: a cross-validation study. *J Am Diet Assoc.* 1995;95(12):1403-1408.
77. Weissman C, Kemper M, Askanazi J, et al. Resting metabolic rate of the critically ill patient: measured versus predicted. *J Anesthesiol.* 1986;64:673-680.
78. Robinson CH, Lawler MR. Undernutrition and protein deficiency: high calorie diet; high-protein diet. In: Beck JJ, ed. *Normal and Therapeutic Nutrition*, Sixteenth Edition. New York, NY. Macmillan Publishing Company, Inc.;1982:497.
79. Warwick PM, Busby R. Prediction of twenty-four-hour energy expenditure in a respiration chamber in smokers and non-smokers. *Eur J Clin Nutr.* 1993;47(8):600-603.
80. Wada L, King JC. Effect of low zinc intakes on basal metabolic rate, thyroid hormones and protein utilization in adult men. *J Nutr.* 1986;116(6):1045-1053.
81. Piers LS, Diffey B, Soares MJ, Frandsen SL, et al. The validity of predicting the basal metabolic rate of young Australian men and women. *Eur J Clin Nutr.* 1997;51(5):333-337.
82. Taaffe DR, Thompson J, Butterfield G, Marcus R. Accuracy of equations to predict basal metabolic rate in older women. *J Am Diet Assoc.* 1995;95(12):1387-1392.
83. Kotler DP, Tierney AR, Brenner SK, Couture S, et al. Preservation of short-term energy balance in clinically stable patients with AIDS. *Am J Clin Nutr.* 1990;51:7-13.
84. Suttman U, Muller MJ, Ockenga J, Hoogestraat L, et al. Malnutrition and immune dysfunction in patients infected with human immunodeficiency virus. *Klin Wochenschr.* 1991;69(4):156-62.
85. Suttman U, Ockenga J, Hoogestraat L, Selberg O, et al. Resting energy expenditure and weight loss in human immunodeficiency virus-infected patients. *Metabolism.* 1993;42(9):1173-9.
86. Slusarczyk R. The influence of the human immunodeficiency virus on resting energy expenditure. *J Acquir Immune Defic Syndr.* 1994;7(10):1025-7.
87. Mulligan K, Tai VW, Chernoff DN, Schambelan M. Viral load and resting energy expenditure in men with HIV infection. *Retro and Opportun Infect Conf (4th).* 1997 Jan 22-26:192 (abstract no. 691).
88. Sharpstone D, Ross H, Murray C, Phelan M, Gazzard B. The Metabolic Status Of Asymptomatic HIV-Seropositive Women. *Int Conf AIDS (11th).* 1996 Jul 7-12;11(2):132 (abstract no. Mo.B.1396).
89. Mulligan K, Tai VW, Schambelan M. Energy Expenditure in Human Immunodeficiency Virus Infection. *Letter. New Eng J Med.* 1997;336(1): 70-71.
90. Vandercam B, Baudoux D, Gillot C, Laterre JF, et al. Resting energy expenditure (REE) in HIV-infected patients. *Int Conf AIDS (8th).* 1992 Jul 19-24;8(3):143 (abstract no. Pub 7569).
91. Anderson R, Grady C, Ropka M. A comparison of calculated energy requirements to measured resting energy expenditure in HIV-1-infected subjects. *J Assoc Nurses AIDS Care.* 1994;5(6):30-4.
92. Bowers JM, Ampel NM, Scott RW, et al. Indirect calorimetry in HIV-infected patients. *Int Conf AIDS (11th).* 1996 Jul 7- 12;11(2):102-103 (abstract no. We.B.3266).
93. Chlebowski RT, Grosvenor M, Lillington L, Sayre J, Beall G. Dietary intake and counseling, weight maintenance, and the course of HIV infection. *J Am Diet Assoc.* 1995;95(4):428-32.
94. James J, Tobias T. Nutrition and AIDS: Interview with Kristin Weaver (Part 2). *AIDS Treat News, Newsletter.* 1994 Aug 19;205. Internet: Rockville, MD:NAC, CDC Online, distributors (accessed 29 Jan 1996).
95. Tinnerello D. Nutritional management of HIV/AIDS from the beginning. Presentation at the Annual Meeting of the Florida Dietetic Association, Marco Island, FL. July 1997.
96. Gorbach SL, Smigelski C. Nutrition for life. *Nutrition for Life, Newsletter.* 1996 Jan;1(1):1.
97. Fields-Gardner C. Food-based nutrients as therapeutic options in HIV care. *Bul Exp Tmts AIDS, Newsletter.* 1994 Sep;22. Internet: Rockville, MD:NAC, CDC Online, distributors (accessed 10 March 1996).
98. Malcolm J, Kelson K, Sutherland DC. Parenteral nutrition maintains or improves nutritional status during acute complications of AIDS. *Int Conf AIDS (7th).* 1991 Jun 16-21;7(1):289 (abstract no. M.B.2428).
99. Personal correspondence. Vasquez S. Mercy Hospital, Miami Florida. August 1997.
100. Meyer SA. HIV/AIDS Nutritional Care Survey: preliminary results. 1997 AIDS Meals Provider's Conference, Miami Beach, FL. September 1997.
101. Vitamin and nutritional supplements in HIV disease. Transcript of BETA LIVE! teleconferences held in April 1994. *Bul Exp Tmts AIDS, Newsletter.* 1994 June;21. Internet: Rockville, MD:NAC, CDC Online, distributors (accessed 31 Jan 1996).
102. Personal correspondence. Fenton M. AIDS Project Los Angeles. March 1997.
103. Dowling S, Mulcahy F, Gibney MJ. Nutrition in the management of HIV antibody positive patients: A longitudinal study of dietetic out-patient advice. *Euro J Clin Nut.* 1990;44:823-829.
104. Burger B, Ollenschlager G, Schrappe M, Stute A, et al. Nutrition behavior of malnourished HIV-infected patients and intensified oral nutritional intervention. *Nutrition.* 1993;9(1):43-4.
105. Position of the American Dietetic Association and The Canadian Dietetic Association: Nutrition intervention in the care of persons with human immunodeficiency virus infection. *J Am Diet Assoc.* 1994;94(9):1042-1045.
106. Walgren M, Chapman T, Williams DM, Meyer SA. Early nutrition intervention for HIV/AIDS. Fact sheet. Florida HIV/AIDS Nutrition Network, Fort Lauderdale, FL. January 1996.